DOCUMENT RESUME

ED 093 055 EA 006 246

AUTHOR	Gajewsky, Stan
TITLE	Class Size: Review of the Literature and Selected Annotated Bibliography. Reports in Education Number 2. A Monograph.
INSTITUTION	McGill Univ., Montreal (Quebec). Faculty of Education.
PUB DATE	73
NOTE	65p.; A related document is EA 006 245
AVAILABLE FROM	Reports in Education, McGill Faculty of Education, 3700 McTavish Street, Montreal, Quebec (Canada) H3A 1Y2 ($3.00, check must accompany order, payable to McGill University)
EDRS PRICE	MF-$0.75 HC-$3.15 PLUS POSTAGE
DESCRIPTORS	Annotated Bibliographies; *Classes (Groups of Students); *Class Size; Facility Utilization Research; Job Satisfaction; *Literature Reviews; Small Classes; *Student Teacher Ratio; Teacher Attitudes; *Work Environment

ABSTRACT

This survey of the literature indicates that the problem of class size is not so much one of the type of subject or student, but more often a problem of teaching technique with different sizes of classes. Some authors maintain that class size in itself is not the important factor, but rather it is a factor which masks other more important variables. One set of arguments which does not yet seem to have been considered in the research literature is that class size is a basic working condition for teachers. More sophisticated study of the effects of differences in class size on teachers is required, in addition to studies of these effects on students. (Author/WM)

ED 093055

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRO-
DUCED EXACTLY AS RECEIVED FROM
THE PERSON OR ORGANIZATION ORIGIN-
ATING IT. POINTS OF VIEW OR OPINIONS
STATED DO NOT NECESSARILY REPRE-
SENT OFFICIAL NATIONAL INSTITUTE OF
EDUCATION POSITION OR POLICY

PERMISSION TO REPRODUCE THIS COPY-
RIGHTED MATERIAL HAS BEEN GRANTED BY

McGill University

TO ERIC AND ORGANIZATIONS OPERATING
UNDER AGREEMENTS WITH THE NATIONAL IN-
STITUTE OF EDUCATION. FURTHER REPRO-
DUCTION OUTSIDE THE ERIC SYSTEM RE-
QUIRES PERMISSION OF THE COPYRIGHT
OWNER.

REPORTS IN EDUCATION

mcgill university

ED 093055

REPORTS IN EDUCATION

Number 2

CLASS SIZE

Review of the Literature

and

Selected Annotated Bibliography

Prepared by

Stan Gajewsky

under the supervision of

Bruce M. Shore

McGill University

©1973

$3.00

REPORTS IN EDUCATION is a monograph series jointly sponsored by the Department of Educational Administration and the Department of Educational Psychology and Sociology, Faculty of Education, McGill University, 3700 McTavish Street, Montreal, Quebec, Canada, H3A 1Y2.

The preparation of this report was made possible by an agreement with the Protestant School Board of Greater Montreal. A total of four literature surveys were completed during the summer and fall of 1973 on Accreditation, Class Size, Learning Disabilities, and Open Education.

We are grateful for the interest and cooperation of Mr. Malcolm H. Stanley, Superintendent of Curriculum, and Dr. E. George Cochrane, Curriculum Coordinator-Course of Study, Protestant School Board of Greater Montreal, in preparing these documents.

Editorial Board

Gillian Rejskind

Bruce M. Shore

Ronald H. Tali

REPORTS IN EDUCATION

McGill University

Montreal

TABLE OF CONTENTS

CHAPTER		PAGE
I.	CLASS SIZE: DEFINITION AND INCONCLUSIVENESS..	1
	The Definition.....	1
	The Inconclusiveness of Class Size.....	2
	Footnotes - Chapter 1.....	8
II.	OPINIONS CONCERNING BEST CLASS SIZE	9
	Opinion Research on Class Size.....	9
	Footnotes - Chapter II.....	15
III.	RESEARCH EVIDENCE FOR LARGE CLASSES.....	16
	Mathematics.....	16
	a. findings.....	16
	English.....	18
	Education.....	20
	a. findings.....	20
	b. conclusion.....	21
	Footnotes - Chapter III.....	22
IV.	RESEARCH EVIDENCE FOR SMALL CLASSES.....	23
	Reading.....	23
	Languages.....	26
	Mathematics.....	29
	Conclusion.....	30
	Footnotes - Chapter IV.....	31

TABLE OF CONTENTS Cont'd.

CHAPTER		PAGE
V.	TOTAL AVAILABLE RESEARCH EVIDENCE FOR CLASS SIZE.....	32
	A subject by subject review of the available research studies and their findings.....	32
	Footnotes - Chapter V.....	40
VI.	CURRENT INTERPRETATION OF PUPIL-STAFF RATIOS AND CLASS SIZES.....	41
	Pupil-Staff Ratios from 1964 - 1971.....	41
	Footnotes - Chapter VI.....	45
VII.	CONCLUSION.....	46
	Footnotes - Chapter VII.....	49
	ANNOTATED BIBLIOGRAPHY.....	50

LIST OF TABLES

TABLE		PAGE
1.	Replies to the NEA Survey.....	10
2.	Actual Class Sizes (of NEA Survey).....	10
3.	Analysis of Variance of Post-Test Scores.....	17
4.	Average reading readiness and reading achievement scores....	23
5.	Mean Reading Achievement (Standard Scores) in the second grade by sex, group, and Readiness Test Prediction.....	24
6.	Mean Reading Readiness, I.Q. and STEP Reading Score in the Fourth Grade for the Experimental and Control Groups.....	25
7.	Mean Scores of Language Classes.....	27
8.	Mean Scores of Language Classes.....	27
9.	Research Results by Subject.....	33
10.	Overall Differences due to Class Size.....	38
11.	Estimated Number of Pupils Per Full-Time Professional Staff Member, All Operating Public School Systems, 1964-1971.....	41
12.	Estimated Number and Per Cent of Elementary School Classes By Size: March 1962, and March 1965.....	43
13.	Number of Additional Classes (and Teachers) Necessary to Reduce Excessive Size Classes to Certain Designated Sizes...	44

CHAPTER I

CLASS SIZE: DEFINITION AND INCONCLUSIVENESS

Studies reported as early as 1895 have been conducted to find some common factor associated with student achievement and learning. Class size has often been proposed as an important factor which influences many of the variables involved in the educational process. This survey proposes to review the literature concerned with class size and develop a taxonomy of the research which deals with this topic.

I. THE DEFINITION

Class size has often been confused with pupil-teacher ratios. These two concepts are entirely different. Otto proposes a definition of class size:

> Class size refers to the number of pupils regularly scheduled to meet in the administrative and instructional unit, known as a class or class section, usually under the direct guidance of a single teacher.[1]

Reisert confirms this definition and supplements his own definition with a clarifying statement concerning pupil-teacher ratios.

> Class size refers to the number of students assigned to and enrolled in a specific class under the direction of a specific teacher. Pupil-teacher ratio, on the other hand refers to the number of students assigned to a school or system divided by the number of full-time and part-time teachers assigned to the school or system. Class size is actually a more realistic indicator of the load any given teacher is likely to have and consequently of the amount of personal attention the individual student is likely to receive.[2]

Therefore, whenever special teachers, supervisors, guidance personnel or administrators are assigned to a school, the pupil-teacher ratio goes down, but the class size remains the same.

II. THE INCONCLUSIVENESS OF CLASS SIZE

The research which has been explored all gives substantial evidence, one way or the other, concerning the size of classes, but there seems to be no absolute optimum class size. In fact, many researchers do not know whether class size can ever be measured without other variables interfering with the results. According to Frymier,

> Most of the previous research on the effect of class size upon academic achievement indicates that other factors are more important than the number of students in each class.[3]

The fact remains, however, that class size problems are important to teachers, parents and students alike. A National Education Association survey taken in 1968 of a nationwide sample of public school teachers reveals this fact.

> The pertinent question presented a list of 17 possible problem areas for teachers, and asked respondents to indicate the extent to which they found each one a major or minor problem or not a problem in their schools. Large class size ranked second for the total group of teachers responding.[4]

This aspect of the problem cannot be ignored. These demands for smaller

classes by teachers and other educators are not merely a recent development.

> From 1926 - 1937, studies dealt with more specific factors such as the effect of class size upon pupil attitudes, teacher knowledge of individual pupils, and so forth. The literature since 1937 is filled with pleas for small classes, arbitrary recommendations of class size and room space, but virtually nothing that might be classified as controlled research bearing directly upon the problem. Certain recent research into group dynamics, noise, effects of teachers on pupil socialization, and so on, that appears on the surface to be peripheral, may be more significant to the problem than all of these seemingly more direct studies.[5]

These peripheral studies, however, are much more easily conducted than direct studies of the problem. Financial difficulties prevent many experimental research studies from being carried out except on a very small scale.

> A survey of the literature reveals that very little experimental work relating to class size has been carried out. A substantial reduction in number of children per class is very expensive, so schools have been financially unable to experiment in this area. Even if reduced class size had a salutary effect on achievement, the district would be unable to take advantage of that knowledge because of the costs involved. Nevertheless, the belief in the efficacy of small classes persists.[6]

It is precisely because of factors such as cost that research has not been a determining factor in the adjustment of class size.

> The determining factors in class-size changes appear to be enrollment and finances, with research evidence a poor third. Since the available research is inadequate and outmoded, it is less likely than ever that it will play a part during the ensuing decade in determining class-size policies and practices and their implications for the construction of new buildings.[7]

Stover suggests even more determining factors which play a larger role in policy determination than the results which research offers.

> Class size appears to be determined by such factors as expediency, birth rate, financial considerations, and the availability of physical facilities.[8]

Expediency, especially, seems to be the single most important factor in many policy decisions.

The Encyclopedia of Modern Education seems to summarize most of the determining factors of class size.

> Increase or decrease in class size generally has gone hand in hand with increase or decrease in enrollment. Declining birth rate, decreased immigration, lack of employment opportunities in time of depression, shifts of population, and induction of pupils into the armed forces in time of war have each, therefore, affected class size.[9]

Why, however, has research not come to the aid of educators in

establishing optimum class sizes for mazimum achievement? The answer, unfortunately, is clouded. Since 1900, there have been approximately 250 studies done on the topic of class size but only twenty or so have been valid studies which controlled other conditions. On the basis of these studies, no hard and fast answers are forthcoming, since there has never been consensus of opinion or of the research itself on optimum class size for most situations.[10] In order for research to be both reliable and valid, it must avoid the typical failings of previous studies.

> Of these failings, one is the wide variation and overlapping in the definition of small and large classes; for example, the range of small classes in various studies was from 7 to 35. Another is the limitation of criteria of educational efficiency to measurable effects on pupils' knowledge. Failure to compare large and small classes in situations where appropriate, characteristic teaching techniques customarily have been applied has weakened the strength of many conclusions.[11]

Is there then, an optimum class size? Have researchers considered the appropriate variables? Can class size be separated from the other variables which surround it or is class size totally independent of such variables? Goodlad seems to think that these questions do not suggest simple answers.

> Most of the studies before 1925 and a few since that time sought to relate

> class size to measurable student achievement. There is nothing in the evidence to suggest that large classes materially affected attainment in subject matter under teaching techniques considered typical at that time. Subsequent studies of the relation of class size to student attention, discipline, self-reliance, attitudes and work habits failed to establish a research basis for decision on class size.[12]

A problem has, therefore, been presented. Can the findings of the current research provide any answers whatsoever to this dilemma of class size?

> The problem may be not so much that the research is inconclusive, but rather that it has not been comprehensive enough. Most researchers have tended to use a single variable approach, although study of the subject may, and probably does, require a multivariate approach.
>
> Almost any position concerning class size and pupil-teacher ratio can be "proven" if empirical studies are selectively chosen. Some studies have demonstrated that large-group instruction is more effective, for certain purposes, than small-group instruction. Other studies have found that the size of groups is directly related to success, participation, or some other factor (Richey 1968)[13]. An examination of the total body of research, however, leaves one with the feeling that there is still a great deal more that educators need to know before they can operate on any truly sound scientific basis in making decisions on class size.[14]

The task of this paper, therefore, will be to present the research which has been done on this subject as objectively as possible.

CHAPTER I

FOOTNOTES

[1] "Class Size," Encyclopedia of Educational Research (Revised Edition), p. 212.

[2] "Class Size," The Encyclopedia of Education, II, p. 157.

[3] Jack R. Frymier, "The Effect of Class Size Upon Reading Achievement in First Grade," The Reading Teacher, XVIII (November, 1964), p. 90.

[4] NEA Research Division, "Class Size: Attitude and Action," NEA Research Bulletin, XLVII (December, 1969), p. 115.

[5] John I. Goodlad, "Room to Live and Learn," Childhood Education, XXX (April, 1954), p. 357.

[6] Irving H. Balow, "A Longitudinal Evaluation of Reading Achievement in Small Classes," Elementary English, XLVI (February, 1969), p. 184.

[7] "Class Size," Encyclopedia of Educational Research (Revised Edition), p. 213.

[8] Frank B. Stover, "Administrator Policies in Class Size," (unpublished Doctoral dissertation, Columbia University, New York, 1954).

[9] "Class Size," Encyclopedia of Modern Education, 1943, p. 143.

[10] Ibid., p. 144.

[11] Ibid.

[12] "Class Size," Encyclopedia of Educational Research, (Third Edition) p. 224.

[13] Robert W. Richey, Planning for Teaching, 4th. edition, (New York: McGraw-Hill Company, 1968).

[14] "Class Size," The Encyclopedia of Education, II, p. 158.

CHAPTER II

OPINIONS CONCERNING BEST CLASS SIZE

There has been an overabundance of material written about class size, but even here, opinions of teachers and students are not well documented. There are three studies in particular which give a good indication of the feelings of students, teachers and administrators regarding the size of classes.

I. OPINION RESEARCH ON CLASS SIZE

Perhaps the best study done to gather the opinions of teachers and principals concerning class size was conducted by the National Education Association (mentioned above). The findings of this study are as follows.

Although the research on the best size of class for effective teaching may be inconclusive, the majority of both elementary- school teachers and principals agree that a class of 20 to 24 pupils is the best size. The NEA Research Division found this agreement of teachers and principals in separate surveys of representative samples of the two groups.

In a general opinion poll the Division asked this question: "In your opinion, what is the best size for most elementary-school classes for effective teaching?"

The Division asked the identical question of a sample of elementary school principals in a survey of their opinions on various school problems.

TABLE 1
REPLIES TO NEA SURVEY

BEST SIZE OF CLASS	% TEACHERS	% PRINCIPALS
less than 20	12.5	13.8
20 - 24	53.7	51.7
25 - 29	31.2	31.6
30 - 34	2.5	2.9
more than 35	0.1	0.0
	100.0	100.0

If a class of fewer than 25 pupils is needed for the most effective teaching, only 20% of the elementary-school teachers in the nation have classes of that size. In fact, half of all elementary-school classes contain 30 or more pupils. Still more disturbing, a fifth of the teachers, 21.0%, have 35 or more pupils each with a substantial group having 40 or more.

TABLE 2[1]
ACTUAL CLASS SIZES

SIZE OF CLASSES	% OF TEACHERS
LESS THAN 20	6.9
20 - 24	12.7
25 - 29	28.4
30 - 34	31.0
35 - 39	14.8
MORE THAN 40	6.2

A Study done at Fordham University interviewed students who participated in large group instruction to ascertain their attitudes toward the large class size, especially with relation to vision, hearing, space, ventilation, opportunity for questions, discussion and faculty consultation, and use of faculty-library reserve shelves.

> Somewhat to the surprise of the experimenters, the large groups seemed as satisfied as the small with the opportunities provided for questions and discussion. The large groups did tend to complain of physical crowding - justifiably, since the experimental classrooms were not perfectly accommodated to 60 students.[2]

Teachers were also asked to give their opinions of the situation of large-size classes.

> They were conscious of greater effort in establishing classroom informality with the large groups and found it harder to assure an appropriate distribution of discussion and to enlist the participation of the disinclined. Their principal criticism, however, touched equally their relationship with small and large classes: the employment of graduate assistants even in so small a role as attendance-taking diluted the intimacy of faculty-student contact;professors therefore experienced difficulty in uncovering students' individual academic difficulties and in stimulating the complacent members of their classes.[3]

A similar survey was made of two large classes of Business Management at the University of Northern Colorado. Only students' opinions were taken here, but the consensus was that the suitability of large classes

was either below average or extremely poor. Most of the replies fell within this range.[4]

It seems, therefore, that in terms of opinion, large classes were doomed from their origin. Much criticism has been directed towards large classes from the periodical literature. Among these critics is J. Lloyd Trump, a noted author in education. He wrote,

> Today's classes are too large for effective discussion. They inhibit adequate participation by individuals and encourage individual isolation from the group. When there are 15 or fewer students in the group, each individual has the chance logistically to participate and the size of the group contributes to his involvement in it.[5]

Other criticisms of large classes come from elementary teachers.

> They felt that it was much harder to teach a large group to listen well. Children in a large group tend to feel less responsibility to be participants. Thus they miss much of the training in group work. Their span of attention is shortened, if indeed they listen and participate at all. And too, there is less creative teaching because the gifted teacher cannot share her particular talents because of class demands.[6]

Ruth Coyner Little mentions the effect of large class sizes on the teacher.

> Teaching is strenuous work at best. It is a constant physical and mental strain. It has great satisfactions, but those satisfactions can be destroyed through the sheer drain on the teacher's energy,

> and that drain can finally affect the quality of the teaching and learning.
>
> Teachers, as well as their pupils, are entitled to good mental and physical health. Their weekends should be free for rest, refreshment, for civic and other community interests. When they must devote their weekends to school work constantly, because of large classes, they tend to become irritable, to lose their sense of humor--and much of the real joy to be found in teaching. They hesitate to start things that make for self-improvement, because they are just too tired.
>
> If all parents everywhere understood how much their child's welfare and happiness in school depended upon being in a class of reasonable size, they would see to it that their schools had the support that would make reasonable class size possible.[7]

Spitzer maintains that there are certain undisputable advantages to small classes which cannot be denied. These, he states, are:

1. The teacher's ability to give more time to individual pupils results in superior achievement by the pupils.

2. The fact that the task of teaching is less difficult makes for higher morale of teachers, which again contributes to a better instructional situation for pupils.

3. The routine teaching activities do not take an undue proportion of time.

4. A less formal instructional program is possible when classes are small.[8]

Thus far, however, all opinion has had a direct bias toward small class sizes. In fact, practically all educators agree that small classes promote better teaching. This is not advocating the abolition of large

classes totally. Goldstein seems to adequately describe the place of large group instruction in the opinion of many educators.

> Large group instruction is neither boon nor bust if one judges its value in terms which are polarized. Under well-considered conditions it has much practical use; when its use is predicated, however, on fashion or exaggerated expectations of instant success, its usefulness is much less guaranteed.[9]

Thus, there is much more favorable opinion on the side of small classes than on that of the large classes. This however, is merely opinion. Although it cannot be simply disregarded, it cannot be used as valid evidence of better achievement by the students.

CHAPTER II

FOOTNOTES

[1]NEA Research Division, "Teachers and Principals Agree on Best Class Size," NEA Research Bulletin,XXXIX (December, 1961), p. 107.

[2]Joseph R. Cammarosano and Frank A. Santopolo, "Teaching Efficiency and Class Size," School and Society, LXXXVI (September, 1958), p. 340.

[3]Ibid.

[4]Virgil Thomas Dock, "The Significance of Class Size in Two College-Level Introductory Classes of Business Management," (unpublished Doctoral dissertation, University of Northern Colorado, Colorado), 1970.

[5]J. Lloyd Trump, "Basic Changes Needed to Serve Individuals Better," The Educational Forum, XXVI (November, 1961), p. 95.

[6]Ruth Coyner Little, ed., "The Effect of Class Size on Learning," NEA Journal, XL (March, 1951), p. 216.

[7]Ibid.

[8]Herbert F. Spitzer, "Class Size and Pupil Achievement in Elementary Schools," Elementary School Journal,LV (October, 1954), p. 83.

[9]William Goldstein, "Large Group Instruction: Boon or Bust?, "The Clearing House, (May, 1967), p. 522.

CHAPTER III

RESEARCH EVIDENCE FOR LARGE CLASSES

There has been much research which supports some aspects of large classes, but very few of these studies claim large classes to be significantly more effective than small classes. Below are a number of the more substantial studies which support large classes.

I. MATHEMATICS

This first study, done by J. Vincent Madden, used as a sample ninth grade students who were randomly selected from nineteen general mathematics classes in seven high schools in Arizona. The students involved in the study were the average achievers who fell between the thirtieth and seventieth percentiles.

General mathematics classes consisting of 70 to 85 students were identified as the large groups while classes consisting of 25 to 40 students were identified as the regular groups. The duration of the experimental study was one semester, with a pre-test being administered during the second week of the fall semester, and the post-test being administered during the final week of the fall semester.

Findings. First, an analysis of variance revealed a significant difference, at the .05 level, in the achievement of students in the large groups over the achievement of students in the regular groups. Second, students in the average ability level in the large groups had significantly higher achievement than the students in the average ability level in the regular groups. (The average ability level contained 67.9% of the population.) There was no significant difference in the achievement of

students in either the high ability level or the low ability level of those students in the large and regular groups.

Below is a table of the analysis of variance performed on the post-test scores.

TABLE 3
ANALYSIS OF VARIANCE OF POST-TEST*SCORES

Source of Variation	df	SS	MS	F
Method	1	144.35	144.35	8.39*
Ability Level	2	913.55	456.78	26.54*
Sex	1	1.28	1.28	.07
MethodXAbility Level	2	18.97	9.48	.55
MethodXSex	1	10.51	10.51	.61
Ability LevelXSex	2	15.90	7.95	.46
MethodXAbility LevelXSex	2	1.03	.52	.03
Within	508	8745.04	17.21	

*Significant at the .05 level.

Conclusions. 1. Student achievement in general mathematics is significantly higher when students are taught in large groups (seventy to eighty-five students) as opposed to regular groups (twenty-five to forty students).[1]

N.B. Even though there was only one teacher actually giving instruction in the large classes, the pupil teacher ratio remained constant since one other teacher was stationed in the class at the time.

Another study done by Daniel J. Menniti in Pennsylvania, using students from Catholic schools at the eighth grade level, revealed a significant difference in achievement in mathematics in large classes for the average pupils in the classes.[2] This study seems to confirm that of Madden, insofar as both studies reveal that achievement in mathematics

seems to be somewhat related to large class sizes for students of average achievement.

II. ENGLISH

There is no evidence in the elementary or secondary school system that justifies large classes explicitly for the subject of English, but below are two studies which might have some overlap.

A.B. Silver published a paper on large English classes at Bakersfield Junior College. Even though the sample was quite small, the conclusions which he makes from his data are worth considering. The achievement of students placed in large English classes (maximum enrollment 100) at Bakersfield Junior College, California, was compared with that of students placed in regular-sized (maximum enrollment 35) sections presenting similar material. At the completion of the Fall 1969 semester, students took the Iowa Test of Educational Development, and their results were compared with previous scores on this test--a test they had taken as part of the college's entrance examination. Gains for the large-group students were significantly better than for those in the regular English 50 classes. Mean and median score gains for the large-group and regular English 60 students differed significantly. A comparison of these groups' subsequent English course completion rates and mean gross point averages revealed no significant differences.[3] Unfortunately, Silver tells us little about the variables such as teachers, methods, and instruction time as well as sex

differences which might have influenced or biased the findings one way or another. At face value, however, the results are quite interesting. The results of this study were used to justify the continuation of large-group instruction at Bakersfield Junior College.

Menniti's study previously cited also revealed significant differences for large groups at the eighth grade level in reading achievement.[4] Although, no description of the process of the study is described by Menniti, his findings concur with Silver's in that both advocate large-group instruction for the teaching of English and Reading.

III. EDUCATION

Christensen studied the effects of varying group size and teaching procedures on certain levels of student learning. A large course section of 63 students was used as the experimental section and a small section of 27 was used as the control class.

Three course examinations were prepared and administered to both groups. Item analysis, a measure of scorer objectivity, and test reliability were computed. A student opinionaire was administered to both groups to obtain an indication of attitudes toward the course and the experiment. The two instructors also wrote evaluations of the course and gave their opinions of the experiment.

Findings. In terms of student performance on examinations, students taught in the large class performed as well as those in the smaller class. The mean scores on all three examinations favored the experimental class though not significantly.

In response to the student questionnaire, the large class rated the course significantly higher than the small class in terms of course plans and objectives, the stimulation of critical thinking, the value of class discussions, and the over-all value of the course.[5]

It should be pointed out, however, that even though the statistics favored the larger classes, the observed differences were not significant. This study supports large classes only insofar as it seems to uphold the other previous studies in this chapter. No attempt whatsoever is being made to equate this study with those in the areas of English and Mathematics. It does, however, suggest that further study in this area might be worth undertaking.

Conclusion.

There are very few studies which uphold large classes as providing better learning facilities and leading to superior achievement. This does not mean that large classes are bad. It merely means, that except for the studies in the areas of English and Mathematics, there has been no evidence to show that large classes can show significantly higher achievement than smaller classes.

(Some additional research on class size has been conducted at the university level.[6] These studies are considered to be outside the terms of reference of this survey.)

CHAPTER III

FOOTNOTES

[1]J. Vincent Madden, "An Experimental Study of Student Achievement in General Mathematics in Relation to Class Size," School Science and Mathematics, (November, 1968), pp. 620 - 621.

[2]Daniel J. Menniti, "A Study of the Relationship Between Class Size and Pupil Achievement in the Catholic Elementary School," (unpublished Doctoral dissertation, The Catholic University of America, 1964), Abstract.

[3]A.B. Silver, "English Department Large-Small Class Study: English 50 - 60, Revised," A paper produced by Bakersfield Junior College, California, July 1970.

[4]Menniti, op. cit.

[5]Joe J. Christensen, "The Effects of Varying Class Size and Teaching Procedures on Certain Levels of Student Teaching," (unpublished Doctoral dissertation, Washington State University, Washington, 1960), Abstract.

[6]See W.J. McKeachie, "Research on Teaching at the College and University Level." Chapter 23 in N.L. Gage (Ed.), Handbook of Research on Teaching. Chicago: Rand-McNally, 1963.

CHAPTER IV

RESEARCH EVIDENCE FOR SMALL CLASSES

There is generally as little evidence for the maintenance of small classes as for large, but it seems that the case for small classes will prove to be stronger in certain areas.

I. READING

Irving H. Balow of the University of California conducted a study in which class size for reading instruction was reduced from thirty students in the average class to fifteen in the experimental program. Grades one through four were tested. The Metropolitan Readiness Tests were administered to all children early in the first grade, Metropolitan Achievement Tests in early second and third grades, and the Sequential Tests of Educational Progress at the fourth grade level. Reading achievement scores for each group were then compared each year using an analysis of covariance.

Table 4 shows the average first grade reading readiness score and the average reading achievement score at early second grade level for experimental and control groups.

TABLE 4

AVERAGE READING READINESS AND READING ACHIEVEMENT SCORES

	N	Metropolitan Reading Readiness %-ile rank	Second Grade Standard Score Reading
Experimental	251	55.5	50.9
Control	744	55.4	48.9

The analysis of covariance of second grade scores controlling on reading readiness resulted in an F-ratio of 5.176, significant at the .05 level. The experimental group scored significantly higher after one year of instruction than the control group on the Metropolitan Achievement Test: Reading. These scores were further analyzed by sex and by readiness test prediction as shown in Table 5.

TABLE 5

MEAN READING ACHIEVEMENT (Standard Scores) IN THE SECOND GRADE BY SEX, GROUP, AND READINESS TEST PREDICTION.

Male Experimental	56.1	48.7	46.5	45.6	49.4
Male Control	53.2	46.9	44.6	39.7	46.4
Readiness test Predictions	A	B	C	D	Mean
DIFFERENCE	2.9	1.8	1.9	5.9	3.0
Female Experimental	58.8	49.9	51.9	46.0	52.4
Female Control	56.9	52.4	48.5	43.6	51.5
DIFFERENCE	1.9	-2.5	3.4	2.4	.9

It will be noted from Table 5 that boys in the experimental group scored higher in reading achievement at each readiness level than did boys in the control group. The difference in achievement between the two groups is statistically significant at the .01 level. The difference in achievement between the two groups of girls is much smaller and is not significant even at the .05 level.

In the third grade, similar comparisons were made. When second

grade reading scores were controlled, again using analysis of covariance, Group I children gained significantly more than other groups.

When fourth grade reading achievement was analyzed, controlling on third grade scores, no significant difference in achievement was found between the groups.

The important question therefore was whether the experimental program would produce significant achievement differences in the fourth grade when reading readiness or IQ were controlled.

For this analysis, two groups were formed. The experimental group was composed of the 656 children who had two or more years of experience in the experimental program. The control group was made up of 602 children who had only one year or less. Table 6 shows the mean reading readiness, IQ, and STEP Reading scores for the two groups.

TABLE 6

MEAN READING READINESS, IQ, AND STEP READING SCORE IN THE FOURTH GRADE FOR THE EXPERIMENTAL AND THE CONTROL GROUPS.

	N	READING Readiness	IQ	STEP Reading
Experimental	656	56.2	110.8	248.9
Control	602	54.4	108.9	245.6

The F-ratio resulting from the analysis of covariance controlling IQ was 9.0. When reading readiness was controlled, the F-ratio was 8.1. Both are significant at the .01 level.[1]

From this study it can be concluded that small classes had a significant effect on achievement in reading when the students were continuously in small classes. One year in a small class, however, did not produce significant differences. Only when the student was able to follow the program geared to the small classes was there any significant achievement.

II. LANGUAGES

Evidence in favor of small classes in language instruction seems to be the clearest. Two experiments were conducted at the Defense Language Institute of the West Coast between July 1963 and January 1964, varying the size of sections from 6 to 14 students. The initial sample of 75 students in eight different language sections resulted in the following comparison:

TABLE 7

Language	Size of Section	Number of Sections	Ave. Grade at 6 wks	Ave. Grade at 12 wks
FRENCH	8	1	84	84
	10	1	78	83
	12	1	79	85
KOREAN	7	1	80	87
	8	1	85.5	76
	12	1	84	79
RUSSIAN	6	1	85.4	88
	12	1	84.5	83

A second experiment, based on a sample of 272 students in 29 different sections, resulted in the following grade comparison:

TABLE 8

Language	Size of Section	Number of Sections	Ave. Grade at 6 wks
CHINESE, MANDARIN	6	2	85.2
	8	3	85.2
	12-13	2	78.8
GERMAN	9-10	4	86.7
	10-11	4	85.0
	11-12	3	83.7
RUSSIAN	7-8	5	80.8
	8	3	82.9
	12	3	79.4

Not reflected in the data above is the student dissatisfaction which arose over the larger classes.

The first experiment, besides being based on a small sample, is inconclusive with regard to the French and Korean sections, although the twelve-week performance of the larger Korean sections shows a distinct drop-off in grades as compared with six-week performance. The second experiment, with the larger sample shows a clear drop-off in learning when the section size increases above eight.

A ninth-week subjective comparison was made of the performance of students in the experimental German sections as compared to that expected of regular 8-man sections at the same point of training. The judgement of the instructors was that the large sections showed clearly lowered standards of pronunciation, comprehension at conversational speeds, and

speaking proficiency. Their ability to manipulate written structural patterns was also considered poorer in the large classes.[2] Horne states that this is because of the limited amount of time available to speak in large classes, plus the fact the number of relationships that each member must maintain with the other members is greatly increased in large groups. These relationships, therefore, become superficial.[3] Brooks also points out that the student of a foreign language needs to hear the foreign language spoken three to five times more distinctly than he hears his native language in order to understand it.[4]

Many other studies have been done in the field of language study and the theoretical justification for the 5 to 9 man class is based upon the following points:

> 1. Language training is best conducted as a small group learning activity, rather than as individual or mass instruction.
>
> 2. Available speaking time is the prime determinant of the upper limit on class size, while degree of social interaction is the prime determinany of the lower limit.
>
> 3. Phonetic considerations dictate that students be close enough to see and hear the instructor clearly; phonemic considerations dictate that they be able to do so three to five times more clearly than for their native language.
>
> 4. An informal level of group discussion may be be facilitated by seating students between 4 and 12 feet from the instructor.[5]

It seems, therefore, that small classes are a prime factor in learning a foreign language if these four points are agreed to. Many studies have confirmed these opinions and classes of more than 15 students cannot possibly be justified from any available research on class size in language instruction.

III. Mathematics

A study was done at the University of Wichita involving students enrolled in the freshman class of the mathematics department. Small classes of an average of 21.4 were studied as well as large classes of an average size of 84.6. These students were taught by standard lecture method using chalkboard examples and so forth. For students in the large sections, six hours of conference time or help sessions were provided.

An analysis of covariance was used to test the effect of class size and high school group on algebra achievement. This covariance analysis revealed a highly significant difference in favor of the students in the small classes over students in the large lecture sections.[6] Data from the study were not available, but the research seems to indicate that exceptionally large classes are a definite liability when the same type of teaching technique is used as in the small classes.

Conclusion

It seems quite obvious that the evidence for large or small classes is not sufficiently conclusive enough to make a single general statement.

There are many studies, however, seemingly support the large classes, and others which seemingly support smaller classes.

CHAPTER IV

FOOTNOTES

[1]Irving H. Balow, "A Longitudinal Evaluation of Reading Achievement in Small Classes," Elementary English XLVI (February, 1969), pp. 184 - 187.

[2]Kibbey M. Horne, "Optimum Class Size for Intensive Language Instruction," The Modern Language Journal LIV (March, 1970), pp. 189 - 195.

[3]Ibid., p. 194.

[4]Nelson Brooks, Language and Language Training: Theory and Practice, New York: Harcourt, Brace, 1964, p. 74.

[5]Horne, op. cit., p. 195.

[6]Harold Franklyn Simmons, "Achievement in Intermediate Algebra Associated with Class Size at the University of Wichita," (unpublished Doctoral dissertation, Iowa State College, 1958), Abstract.

CHAPTER V

TOTAL AVAILABLE RESEARCH EVIDENCE FOR CLASS SIZE

As presented in the last two chapters, very little evidence has been revealed for the advantages of either large or small classes. Of the many studies and surveys reviewed, 46 have been selected as being relevant to the question of class size.

This chapter will first present a subject by subject review of the available research studies and their findings. Second, it will present an overall estimate of whether large or small classes have been confirmed by the research.

I. A SUBJECT BY SUBJECT REVIEW OF THE AVAILABLE RESEARCH STUDIES AND THEIR FINDINGS

Below (Table 9) are the available research studies that have been made on the subject of class size in the various subject areas. The studies that have researched more than one subject will be repeated under separate headings. The studies are entered in the table to show whether they favored large or small classes, and whether or not the differences observed were significant.[1]

TABLE 9

RESEARCH RESULTS BY SUBJECT

STUDY (Author)	LARGE significant	LARGE not significant	EQUAL	SMALL not significant	SMALL significant
READING					
Frymier					X
Balow					X
Menniti				X	
LANGUAGES					
Horne					X
Paquette					X
Ciotti					X
MATHEMATICS					
Madden	X				
Simmons					X
Menniti	X				
SCIENCE					
Hennebry					X
Williams				X	
Macomber					X
SPECIAL ED.					
Keliher					X
Maul					X

cont'd. . .

TABLE IX Cont'd.

STUDY (Author)	LARGE significant	LARGE not significant	EQUAL	SMALL not significant	SMALL significant
HISTORY					
Eastburn		X			
ENGLISH					
Marklund					X
Williams	X				
Eastburn		X			
Silver		X			
GEOMETRY DRAWING					
Haskell				X	
EDUCATION					
Goldstein				X	
Draves				X	
Christensen		X			
Stephens	X				
Nelson			X		

cont'd. . .

TABLE IX Cont'd.

STUDY (Author)	LARGE significant	LARGE not significant	EQUAL	SMALL not significant	SMALL significant
ECONOMICS					
Cammarosano				X	
Dock				X	
Cram			X		
SOCIOLOGY					
Cammarosano				X	
CREATIVE DRAWING					
Lansing			X		
ACCOUNTING					
Stearns				X	
PHYSICAL EDUCATION					
Overstreet					X
Verducci					X
Hicks				X	
POLITICAL SCIENCE					
Cammarosano			X		
Cram			X		

Cont'd. . .

TABLE IX Cont'd.

STUDY (Author)	LARGE significant	LARGE not significant	EQUAL	SMALL not significant	SMALL significant
POLITICAL SCIENCE Cont'd.					
Nelson			X		
TYPING					
Good				X	
KINDERGARTEN					
Keliher					X
Maul					X
ALL SUBJECTS					
Johnson and Lobb			X		
Spitzer				X	
Little (opinionnaire)					X
NEA (opinionnaire)					X
Marklund			X		
THINKING SKILLS					
Bostrom				X	
Vincent			X		

cont'd. .

TABLE IX Cont'd.

STUDY (Author)	LARGE significant	LARGE not significant	EQUAL	SMALL not significant	SMALL significant
THINKING SKILLS Cont'd.					
Thomas			X		
Woodson				X	
HUMAN DEVELOPMENT					
Shane					X
Richey					X
NEA					X
TEACHER HEALTH					
Reeves			X		
Carrothers			X		
TOTAL COLLEGE SUBJECTS					
Siegel				X	

The only areas of study which revealed small classes as having a significant and distinct advantage were LANGUAGES, SPECIAL EDUCATION, KINDERGARTEN, and HUMAN DEVELOPMENT. All the other areas did not have sufficient research to support them one way or the other.

It is interesting to note the discrepancies within the areas of study. This discrepancy can be accounted for only by the assumption that other variables besides class size must have affected the results. Such things as sample size, type of teaching and teacher, and other "control" variables may have had a serious effect on some of the studies. The authors of these studies, however, have all maintained that as many variables as possible were controlled.

It is interesting to note the frequencies of levels of differences which the total number of studies reveal (in Table 10)

TABLE 10

OVERALL DIFFERENCES DUE TO CLASS SIZE
(To obtain this, the five levels of differences in Table 9 were given a whole value number of from 1 for large and significant to 5 for small and significant)

STUDY (Author)	1	2	3	4	5
Frymier					X
Balow					X
Menniti				X	
Horne					X
Paquette					X
Ciotti					X
Madden	X				
Simmons					X
Menniti	X				
Hennebry					X
Willlams				X	
Macomber					X
Keliher					X
Maul					X
Eastburn		X			

Cont'd . . .

TABLE 10 (Cont'd.)

STUDY (Author)	1	2	3	4	5
Marklund					X
Williams	X				
Eastburn		X			
Silver		X			
Haskell				X	
Goldstein				X	
Draves				X	
Christensen		X			
Stephens	X				
Nelson			X		
Cammarosano				X	
Dock				X	
Cram			X		
Cammarosano				X	
Lansing			X		
Stearns				X	
Overstreet					X
Verducci					X
Hicks				X	
Cammarosano			X		
Cram			X		
Nelson			X		
Good				X	
Keliher					X
Maul					X
Johnson and Lobb			X		
Spitzer				X	
Little					X
NEA					X
Marklund			X		
Bostrom				X	
Vincent			X		
Thomas			X		
Woodson				X	
Shane					X

Cont'd. . .

TABLE 10 (Cont'd.)

STUDY (Author)	1	2	3	4	5
Richey					X
NEA					X
Reeves					
Carrothers			X		
Siegel				X	
TOTALS	4	8	36	60	80

Taking an average level of the column totals given above, the mean is 3.418. Therefore, the overall consensus of the 55 studies in various teaching areas is that class size either makes no difference whatsoever, or has a slight advantage in favor of small classes. This overall score is virtually meaningless for practical considerations, however, because the individual subjects themselves are the areas with which we should be concerned.

CHAPTER V

FOOTNOTES

[1]All of the studies which were used for this table are found in the annotated bibliography at the end of this paper. Any references which are not included by name are found within the articles dealing with their specific subject.

CHAPTER VI

CURRENT INTERPRETATION OF PUPIL-STAFF RATIOS AND CLASS SIZES

In the previous chapters, research for and against small and large classes was presented. What have ministries of education done with this research? The current practices dealing with pupil-teacher ratios and class sizes seem to emphasize the lack of a definite policy in this regard.

1. PUPIL-STAFF RATIOS FROM 1964 - 1971

Table 11 below portrays an estimated number of students assigned to each professional staff member in the U.S.A. This survey was done by an accredited agency, the National Education Association.[1]

TABLE 11

ESTIMATED Number of Pupils Per Full-Time Professional Staff Member, All Operating Public School Systems, 1964 - 1971.

Item	Number of Pupils per Full-Time Staff Member			
	1964-65	1966-67	1968-69	1970-71
Teachers	25.4	23.8	23.1	22.4
Principals and asst. principals	488.4	470.3	487.6	487.2
Other Instructional staff	596.5	475.2	461.2	419.1
Total Instructional staff	23.2	21.6	21.0	20.4
Central Office Adm. Staff	930.1	775.5	799.3	698.0
Total-all staff	22.6	21.0	20.5	19.8

It seems, from the data in Table 11, that the main cause for a drop in pupil-teacher ratio, statistically, is the acquisition by the boards of education of specialized personnel in administration and other fields which have little to do with the actual balance which is maintained in the classroom itself. As was previously stated, however, pupil-teacher ratio does not give a realistic picture of the actual situation within the classroom.

Table 12 portrays the actual estimated percentage of classes with the various number of students in each of the classes. This table gives a more realistic portrayal of the actual day-to-day situation which various teachers encounter in the classroom. Unfortunately, the spread of class sizes is huge. Average class size means little when the range extends from fewer than fifteen to more than fifty-six.

Perhaps there are other factors which should be investigated in order to establish certain norms for certain areas of class size. It seems, for example, that the evidence is relatively clear for certain subjects. Languages, for example, are taught much more efficiently in small classes while subjects which require manual dexterity can be learned quite well in large classes.

TABLE 12[2,3]

Estimated Number and Per Cent of Elementary School Classes
By Size: March 1962 and March 1965

March 1962			March 1965		
pupils per class	number of classes	Cumulative per cent	pupils per class	number of classes	Cumulative per cent
≥ 56	574	.105	≥ 56	284	.051
55	33	.111	55	41	.058
54	68	.124	54	35	.065
53	71	.137	53	60	.075
52	65	.149	52	74	.089
51	117	.170	51	80	.103
50	201	.207	50	139	.128
49	162	.237	49	247	.172
48	273	.287	48	364	.237
47	381	.357	47	413	.311
46	483	.445	46	658	.429
45	905	.612	45	804	.574
44	1146	.822	44	1229	.794
43	1452	1.088	43	1104	.992
42	2182	1.489	42	1668	1.291
41	2965	2.033	41	2183	1.682
40	5330	3.011	40	3511	2.312
39	7148	4.322	39	4889	3.188
38	10719	6.289	38	8406	4.695
37	14778	9.000	37	12357	6.911
36	19940	12.659	36	17133	9.983
35	26717	17.561	35	24147	14.312
34	30432	23.145	34	30362	19.755
33	34581	29.490	33	35652	26.147
32	39331	36.707	32	41409	33.571
31	40861	44.204	31	44495	41.549
30	45867	52.620	30	48166	50.184
29	40212	59.998	29	44601	58.181
28	39138	67.179	28	42079	65.725
27	35058	73.612	27	38898	72.699
26	30288	79.169	26	33535	78.711
25	26624	84.054	25	29866	84.066
24	19994	87.723	24	22597	88.117
23	15650	90.595	23	16765	91.123
22	12261	92.844	22	12426	93.351
21	8765	94.453	21	8884	94.943
20	6953	95.728	20	7098	96.216

TABLE 12[2,3] (Cont'd.)

March 1962			March 1965		
pupils per class	number of classes	Cumulative per cent	pupils per class	number of classes	Cumulative per cent
19	4866	96.621	19	4414	97.007
18	3487	97.261	18	3426	97.622
17	2308	97.684	17	2340	98.041
16	1849	98.024	16	1521	98.314
15	10771	100.000	≤15	9405	100.000
TOTAL	545,006			557,765	

Unfortunately, more current statistics are not available at the present, but Table 12 emphasizes the nearly impossible task of reducing class size, if a reduction in class size is necessary. Table 13 shows the number of additional classes necessary to reduce excessive class sizes in some districts identified in the NEA report.[4]

TABLE 13

Number of Additional Classes (and Teachers) Necessary to Reduce Excessive Size Classes to Certain Designated Sizes

Population of district	number of districts	number of classes	Number of additional classes necessary to reduce excessive size classes to 25	30	35	40	45
over 500,000	12	44816	16272	7084	2064	381	39
100,000-499,999	47	26735	8004	3049	741	108	13
30,000- 99,999	125	21293	4229	1272	224	29	6
10,000- 29,999	156	9079	1789	581	127	19	3
5,000- 9,999	130	4004	892	315	88	22	5
2,500- 4,999	56	1088	233	79	21	4	[illegible]
TOTAL	526	107015	31419	12380	3264	563	66

The costs of a decrease in class size from the present standard to an overall norm of 30 students would be astounding.

Pedagogical considerations do not appear to be paramount in the actual decisions concerning class size, even with regard to the opinions reviewed in Chapter II.

CHAPTER VI

FOOTNOTES

[1]NEA Research Division, "Pupil-Staff Ratios, 1970-1971," NEA Research Bulletin, IL (December, 1971), p. 117.

[2]_____, "Class Size in Elementary Schools," NEA Research Bulletin, XL (December, 1962), p. 108.

[3]_____, "Class Size in Elementary School," NEA Research Bulletin, XLIII (December, 1965), p. 107.

[4]_____, "Class Size is Out of Hand," NEA Journal, XLII (December, 1963), p. 556.

CHAPTER VII

CONCLUSION

When all the information has been gathered and a concluding remark is sought, opinions still differ. There is, however, a common denominator to the problem of class size. Most authors agree that the problem is not so much one of the type of subject or student, but more often a problem of teaching technique with different sizes of classes. In other words, what works for one teacher might be disastrous for another. Other authors maintain that class size in itself is not the important factor, but rather it is a factor which masks other, more important variables.

Otto, in reviewing the literature on class size makes four conclusions which are listed below.

1. There is great variation in actual class sizes both within and between subjects, schools, school systems and school levels. While some of this variation seems unavoidable, much is unnecessary and probably undesirable.

2. On the basis of criteria used in the experimental studies published to date and under typical group teaching procedures, mere size of class has little significant influence on educational efficiency as measured by achievement in the academic subjects.

3. Although experimental evidence does not provide a clear-cut answer to the class-size issue, the general trend of the evidence places the burden of proof squarely upon the proponents of small classes.

4. At the elementary-school level the evidence from research indicates that small classes are to be <u>preferred</u> over large classes.[1]

In the form of a conclusion, therefore, points of interest arising from this paper are noted in point form:

1. There is no overall answer to the question of class size. The research evidence studied in this paper shows that, on the whole, smaller classes have more professional support, but not supported by evidence of consistent better learning.
2. Class size is directly related to the method of the teacher and the subject taught. Some subjects, such as the teaching of languages, show evidence that small classes are better.
3. Class size is also directly related to the type of student and his capabilities. Most of the research finds little or no difference in any of the subject areas for the above average student. Also, it must be assumed that students who are handicapped in any way require more attention. This need for more attention presupposes either smaller classes or more teachers or assistants in a single class.
4. Further research must be done which is both reliable, valid, and, in particular, generalizable, on the question of class size.
5. There have been no current studies which are worth mentioning that have been done in the Montreal area on class size in any of the subject areas. Therefore, all class size implications are obtained from sources which might have little relevance to the situation in the Montreal area.
6. With the growing importance of experiments in open education, class or group size becomes very important, especially when included with such

variables as student attention, individual instruction, team teaching, small group instruction, etc. The results of class size experiments might prove detrimental to one or the other of these variables. Their interactions should be studied.

7. Presently, class size is dictated by such things as space, school population, available funds, and tradition. Research has had very little to do with any trends in class size management.

8. Probably one of the best ways to theoretically solve the class size problem is to attack the problem through the teachers. Teacher supervision and evaluation would enable an administrator in charge of personnel to give teachers a class size which is best for his or her type of instructional methods.

9. Other variables besides class size must be tested. If teacher technique, subject, and type of pupil seem to be factors which vary in class size research, then these variables have to be studied apart from class size.

It seems clear, from these 9 points, that there is still a great deal we do not know about class size. It is the opinion of the author, that class size, as a variable means very little when all other variables are controlled. It will only be through a study of these other variables that any light will be thrown upon the class-size dilemma.

Studies in fields such as Special Education where class size is in direct proportion to the difficulties that students have in learning may be

a generally good approach.

Finally then, from the point of view of the teacher, one set of arguments which does not yet seem to have been considered in the research literature might be most important. Class size is a basic working condition. It might well be more pleasant to work in a smaller or larger class in different circumstances. More sophisticated study of effects of differences in class size on teachers is required, in addition to effects on students.

CHAPTER VII

FOOTNOTE

[1]"Class Size," Encyclopedia of Education l Research (Revised Edition), p. 215.

ANNOTATED BIBLIOGRAPHY

BOOKS

"Class Size," The Encyclopedia of Education, II, pp. 157 - 160.
A good summary of the current research on class size done in the United States with a bibliography.

"Class Size," Encyclopedia of Educational Research (Fourth Edition), pp. 144-146.
A brief summary of the current research on class size but supplemented by an excellent bibliography on current articles and theses on the topic.

"Class Size," Encyclopedia of Educational Research (Third Edition), p. 224.
A very brief review of the literature on class size with a supplemental bibliography geared more toward classroom organization than class size.

"Class Size," Encyclopedia of Educational Research (Revised Edition), pp. 212 - 216.
A good survey of the literature on class size with a brief historical background of the topic and a review of current trends and administrative efficiency of the class size problem.

"Class Size," Encyclopedia of Modern Education (First Edition), pp. 143 - 145.
A good survey of past research on class size, especially that done from 1900 - 1940. It is more of an historical overview than a recent statement of the problem.

PERIODICALS

Balow, Irving H. "A Longitudinal Evaluation of Reading Achievement in Small Classes," Elementary English, XLVI (February, 1969), 184 - 187.
A good research study done in Riverside, California, based upon the assumption that reading instruction provided in small classes is more effective than in large classes. The hypothesis was confirmed and it was concluded that, in smaller classes, increased attention can be given to the needs of individuals.

Cammarosano, Joseph R. and Frank A. Santopolo. "Teaching Efficiency and Class Size," School and Society, LXXXVI (September 27, 1958), pp. 338 - 341.
A good study testing the following hypothesis: "Given good teaching, a large class with good quality will equal the achievement of a small class with the same quality." Mixed findings were inconclusive but specific areas prove interesting.

PERIODICALS, Cont'd

Conrad, M.J. and W. Griffith. "Organizational Character of Education: Facility Planning and Business Management," Review of Educational Research, XXXIV (October, 1964), pp. 470 - 484.
A brief survey of some of the studies regarding class size with an emphasis on the inconclusiveness of the topic and the need for repeated and reliable research.

Eastburn, L.A. "Report of Class Size Investigations in the Phoenix Union High School, 1933 - 34 to 1935 - 36," Journal of Educational Research, XXXI (October, 1937), pp. 107 - 117.
This is a summary of a controlled experiment which was conducted in the Phoenix Union High School to ascertain the relative efficiency of instruction in large and small classes on three ability levels. This is an excellent and well documented study which seems to be very reliable. Numerous hypotheses are tested and many conclusions are drawn from the results.

Frymier, Jack R. "The Effect of Class Size Upon Reading Achievement in First Grade," The Reading Teacher, XVIII (November, 1964), pp. 90 - 93.
A fair study on the assessment of the effect of class size on reading achievement. Although the sample used is relatively small, there seems to be clear evidence that class size did influence student achievement.

Goldstein, William. "Large Group Instruction: Boon or Bust?, "The Clearing House, (May, 1967), pp. 520 - 522.
A good summary of the pros and cons of large group instruction. Experimental teaching wi large groups was conducted with different types of teaching methods and the results were classified into different learning groups. No definite conclusion is drawn as to the exact efficiency of large groups.

Goodlad, John I. "Room to Live and Learn," Childhood Education, XXX (April, 1954), pp. 355 - 361.
An excellent article on class size with a summary of relevant research, an analysis of certain related hypotheses and the questions they pose for parents and educational workers and some possible responsibilities for those concerned with the problem. A good bibliography is also provided.

Haskel, Simon. "Some Observations on the Effects of Class Size Upon Pupil Achievement in Geometrical Drawing," The Journal of Educational Research, LVIII (September, 1964), pp. 27 - 30.

PERIODICALS, Cont'd.

A comprehensive study done in a specific area which seems to be very reliable and valid despite the small sample used in the investigation. Statistical procedures are exact and an analysis of the results proves very interesting. The findings, overall, are inconclusive but the implications are worth further study.

Hennebry, H. M. "Sixteen Students Too Many," Science Education, IL (April, 1965), pp. 259 - 261.
This article is more of an opinion on the size of classes than a study. However, it does reveal some findings on the desirability of small classes even though the statistical procedures are rather slipshod, and the reliability of the study cannot be justified.

Horne, Kibbey M. "Optimum Class Size for Intensive Language Instruction," The Modern Language Journal, LIV (March, 1970), pp. 189 - 195.
An Excellent article. This is one of the best arguments for small classes concerning language instruction. The statistical procedures and results seem to prove conclusively that small class instruction is not only desirable but necessary for intensive language instruction. The qualifications of the contributors to this article are undeniable, and the evidence seems both reliable and valid.

Johnson, Robert H. and M. Delbert Lobb. "Jefferson County, Colorado, Completes Three-Year Study of Staffing, Changing Class Size, Programming, and Scheduling," National Association of Secondary School Principals Bulletin, VL (January, 1961), pp. 57 - 78.
A well-documented study with the purpose of determining the effects of numbers of learners upon the achievement, attitudes, and behavior of the learners. Class size, in itself, proved to be insignificant.

Lind, C. George. "Pupil-Teacher Ratios," American Education III (November, 1967), p. 33.
A graphic depiction of pupil-teacher ratios from the year 1956 to 1976. The projected figures show a gradual decline of elementary and secondary school ratios with a steady increase in the ratios concerning higher education.

Madden, J. Vincent. "An Experimental Study of Student Achievement in General Mathematics in Relation to Class Size," School Science and Mathematics, (1968), pp. 619 - 622.
A rather weak and unreliable study done over the course of one semester with a small sample of ninth grade students. The study, however, showed

PERIODICALS, Cont'd

a significant difference in favor of large classes, (seventy to eighty-five students) regarding the subject of general mathematics. The conclusions seem to have been drawn rather hastily without considering other factors which might have influenced the results.

Marklund, Sixten. "Scholastic Attainments as Related to Size and Homogeneity of Classes," Educational Research, VI (November, 1963), pp. 63 - 67.
A national study of class size done in Sweden where differences failed to appear when such factors as level and homogeneity of intelligence, standard scores and social patterns were controlled. The 281 comparisons made revealed 37 favoring the large classes, 22 the small classes and the remaining 222 were not significant.

Maul, Ray C. "How Large are High School Classes?," National Association of Secondary School Principals Bulletin, IL (January, 1965), pp. 103 - 113.
An overview of the current situation across the United States regarding the size of High School classes. Notice is taken of each individual subject and the mean class sizes as well as the extremes. The study included a total of 814, 147 classrooms for the 1963-64 school year.

National Education Association Research Division. "Class Size is Out of Hand," NEA Journal, XLII (December, 1953), pp. 555 - 556.
An interesting article pointing out the extremes regarding class sizes must be reduced.

_____, "The Effect of Class Size on Learning," NEA Journal, XL (March, 1951), pp. 215 - 216.
This article is merely the presentation of the opinions of a group of elementary school teachers on the topic of class size. On the basis of research, it has little worth, but it states to a man, that teachers prefer smaller classes because of the paperwork, un-individuality, lack of sufficient control which large classes present.

_____, "Class Size in Elementary Schools," NEA Research Bulletin, XL (December, 1962), pp. 105 - 110.
This is a presentation of the data of a nation-wide survey of Elementary schools concerning the size of classes therein. Breakdowns of estimated numbers and cumulative percentages of elementary school classes by size present some staggering figures regarding large classes. The article also brings up the question of teacher effectiveness in classes of various sizes and suggests further research in this area.

PERIODICALS, Cont'd

_____, "Class Size in Elementary School," NEA Research Bulletin, XLIII (December, 1965), pp. 106 - 109.
The presentation of the data of a nation-wide survey which emphasizes the tremendous spread of class sizes. The word "average" seems to have little meaning in such a case since the average class size of 30 pupils represents only 8.6% of the total population. Tables of the figures are presented and they show the current situation of the schools in the United States.

_____, "Class Size in Secondary Schools," NEA Research Bulletin, XLIII (February, 1965), pp. 19 - 23.
The data of a nation-wide survey of secondary schools shows that the larger the school system, the larger the typical class size. A subject by subject breakdown of class sizes is presented and a re-emphasis is made of the meaninglessness of a median class size when the range is so wide.

_____, "Teachers and Principals Agree on Best Class Size," NEA Research Bulletin, XXXIX (December, 1961), pp. 107.
Although research on the best class size for effective teaching may be inconclusive, the majority of both elementary school teachers and principals agree that a class of 20 - 24 pupils is the best size. Eighty percent of the teachers have more than this effective teaching load. Ninety-seven percent of teachers and principals agreed that 20 - 24 students was the ideal class size.

_____, "Class Size: Attitude and Action," NEA Research Bulletin, XLVII (December, 1969), pp. 115 - 116.
A survey of a nation-wide sample of public-school teachers revealed large class sizes as the second most pertinent problem facing teachers. The article goes on to mention the role of local and state-wide negotiations regarding class size and how important these provisions are.

_____, "Pupil-Staff Ratios, 1966 - 67," NEA Research Bulletin, XLVI (March, 1968), pp. 18 - 21.
A nation-wide survey of the actual pupil-staff ratios in the United States. A comparison is made with the previous year and various histograms of the distribution of professional staff are given. The statistics show a higher rate of increase in the number of staff as opposed to the increase in pupil population.

_____, "Pupil-Staff Ratios, 1968 - 69," NEA Research Bulletin, XLVIII (May, 1970), pp. 50 - 53.
This article consists of tables giving the number of professional staff by enrollment groupings of school systems, total enrollment, the number of staff members by position and the number of pupils per staff member,

PERIODICALS, Cont'd

and a listing of school systems, for each one of which are shown the number of teachers and other professional staff and the number of pupils per individual professional.

_____, "Pupil-Staff Ratios, 1970 - 71," NEA Research Bulletin, IL (December, 1971), pp. 113 - 117.
This set of tables shows the estimated full-time professional staff and percent distribution of all public school systems, the total enrollment, and the estimated number of pupils per full-time professional staff member. The trend from the 1966-67 results seems to be steadily increasing. There is a higher rate of increase in professional staff in proportion to students.

Shane, Harold G. "Class Size and Human Development," NEA Journal, L (January, 1961), pp. 30 - 32.
A summary of the research on class size and human development which presents three conclusions based on solid data.
The author's opinion is that only when a teacher's work load is kept within reason can he be expected to do an adequate job on other institutionally important tasks such as curriculum development and evaluation.

Spitzer, Herbert F. "Class Size and Pupil Achievement in Elementary Schools," Elementary School Journal, LV (October, 1954), pp. 82 - 86.
A brief review of several studies done in the area of class size and the presentation of a study done in Iowa. The results supported the results of the previously stated research in the article which maintains that there is no significant difference in the size of the class when correlated with achievement. Spitzer also points out several suggestions for further avenues of study.

Trump, J. Lloyd. "Basic Changes Needed to Serve Individuals Better," The Educational Forum, XXVI (November, 1961), pp. 93 - 101.
The opinion of the author on the topic of class size is presented. No sources are cited whatsoever, and the article presents little more than one educator's opinion even though Trump is a noted author and very well known in education. The slant is towards smaller classes which would enable schools to provide more individualized attention to the students and enable the teachers to free themselves from secretarial duties and devote more time to the students.

THESES

Bartley, Imon Dalton. "Class Size in the Classified Public High School Districts of Missouri, 195[illegible] - 56."
Unpublished Ed.D. dissertation, The University of Missouri, Missouri, 1957.
A comparison of the class sizes of other States in regard to the state of Missouri. Standards were set up regarding class size and the optimum size was established at between 20 - 39 pupils.

Bostrom, Edwin Albert. "The Effect of Class Size on Critical Thinking Skills," Unpublished Ed.D. dissertation, Arizona State University, Arizona, 1969.
The purpose of this study was to help determine whether achievement of critical thinking skills is a function of class size. It was further proposed that the degree of relationship among achievement level, class size, and the attainment of critical thinking skills could be ascertained. The findings of this study revealed that no significant difference in student achievement could be attributed to class size.

Christensen, Joe J. "The Effects of Varying Class Size and Teaching Procedures on Certain Levels of Student Learning." Unpublished Ph.D. dissertation, Washington State University, Washington, 1960.
This experiment dealt with a study of the effects of varying group size and teaching procedures on certain levels of student learning. The major hypothesis tested was that large classes can be taught as effectively as small classes, with some economy of instructor time, provided teaching procedures appropriate for different levels of learning are used with varying group sizes.

Cram, Brian Manning. "An Investigation of the Influence of Class size Upon Academic Attainment and Student Satisfaction." Unpublished Ed.D. dissertation, Arizona State University, Arizona, 1968.
The purpose of this study was to determine if there was a significant difference in the academic attainment and satisfaction of students when they were taught in above average as opposed to average sized groups. The study was tested on classes of Business Law, Introduction to Business, and Government.

Dock, Virgil Thomas. "The Significance of Class Size in Two College-Level Introductory Classes of Business Management." Unpublished Ph.D. dissertation, University of Northern Colorado, Colorado, 1970.
This class size study in business management was conducted in regard to both achievement differences and student opinions. There was no significant difference regarding achievement, but the consensus of opinion regarding the suitability of large classes was that they were very poor.

THESES, Cont'd

Draves, David Daniel. "A Study of Class Size and Instructional Methods." Unpublished Ph.D. dissertation, The University of Wisconsin, Wisconsin, 1957.
The main achievements of all small class students were higher than those of all large class students on eleven measures made of student achievement; their mean attitudes more favorable on all ten items of the attitudes scale.
Although the difference was not statistically significant, the author makes further interesting implications.

Good, Glenn Arthur. "The Effect of Class Size on Skills acquired in Typing I." Unpublished Ed.D. dissertation, The Pennsylvania State University, Pennsylvania, 1970.
A rather small study encompassing only two classes over the period of one year. As a result of such a small sample, however, many variables were able to be held constant, and the findings are quite valid. Minimal differences appear in various areas which the author describes and overall, the larger group achieves significantly better than the small.

Hicks, Dorothy Elma. "The Relationship of learning Efficiency to Class Size in Badminton, Beginning Swimming, and Volleyball Classes." Unpublished Ed.D. dissertation, The University of Tennessee, Tennessee, 1964.
A good study on physical education classes. The findings indicated that, in general, there is no significant relationship between class size and learning efficiency in badminton, beginning swimming, and volleyball; however, the small beginning swimming class made a significantly greater gain in skill than the large class, similarly in the small volleyball class.

Lansing, Kenneth Melvin. "The Effect of Class Size and Room Size Upon the Creative Drawings of Fifth Grade Children." Unpublished Ed.D. dissertation, The Pennsylvania State University, Pennsylvania, 1956.
A fair study on the effect of class size on the creative drawing of fifth graders. An analysis of variance showed that class size has no effect upon the creative drawings of children, under conditions present in this study.

Madden, Joseph Vincent. "An Experimental Study of Student Achievement in General Mathematics in Relation to Class Size." Unpublished Ed.D. dissertation, Arizona State University, Arizona, 1966.
A good study using a fairly large sample. The results of the study revealed a significantly different finding in favor of large groups.
Students in the mean ability level achieved significantly higher in the

THESES, Cont'd.

large group than in the small.

Menniti, Daniel J. "A Study of the Relationship Between Class Size and Pupil Achievement in the Catholic Elementary School." Unpublished Ph.D. dissertation, The Catholic University of America, Pennsylvania, 1964.
A comprehensive study of the achievement of small and large groups on a mathematics test in the eighth grade. A significant difference for large classes emerged.

Overstreet, Earle Leroy. "Effect of Class Size on Achievement in Physical Education." Unpublished Ed.D. dissertation, West Virginia University, West Virginia, 1967.
It was the purpose of this study to determine the effect of selected class sizes and teaching method on the amount of skill and associated information gained in a physical education activity. The results were significant for small classes in physical activities, but not significant for associated information.

Simmons, Harold Franklyn. "Achievement in Intermediate Algebra Associated with Class Size at the University of Wichita." Unpublished Ph.D. dissertation, Iowa State College, Iowa, 1958.
This study was conducted in the subject of mathematics and subject to the conditions and restrictions of this study, it can be concluded that students in large lecture sections of intermediate algebra show less achievement than do similar students enrolled in small sized classes. A good study with a fairly large sample was used so that the results are quite reliable.

Stearns, Ray Allen. "An Experiment with Class Size in the Teaching of Elementary Accounting." Unpublished Ed.D. dissertation, Oklahoma State University, Oklahama, 1969.
This was a good study using pre and post tests to verify their findings. The final results showed no significant difference in academic achievement between classes. The difference that did exist, however, favored the small classes in both semesters.

Stephens, Lester Dow. "A Study of the Relative Effects of Selected Teaching Procedures Relating to Differential Class Size on the Attainment of Objectives in An Introductory Survey Education Course."
Unpublished Ph.D. dissertation, University of Miami, Miami, 1964.
It was the purpose of this study to investigatethe relative effects of selected teaching procedures relating to differential class size in

THESES, Cont'd

terms of acquisition of content, development of attitudes, increase in understanding, and opinions of students regarding various aspects of the course. Conclusions were varied but interesting conclusions are drawn from the data by the author.

Thomas, George Martin. "The Effect of Class Size on the Development of Several Abilities Involved in Critical Thinking." Unpublished Ed.D. dissertation, Temple University, 1970.
A good study of the effect of class size. There was no significant difference attributable to class size in the performance of students in the experimental classes on a test of retention. Also, when the three experimental classes were compared in a test of retention on post-post test measures to a control group, it was found there was no significant difference in achievement among the large, intermediate, standard and control groups.

Verducci, Frank Morris. "The Effects of Class Size Upon Learning of a Complex Motor Task by College Students." Unpublished Ed.D. dissertation, Stanford University, California, 1967.
Male and female subjects combined in small classes performed significantly higher than subjects in a large size class. Male and female students combined in a small size class did not produce a significant difference when compared with the individuals in a middle sized class. Male and female subjects combined in a medium size class scored higher but not significantly so, than subjects in a large class.

Williams, Clarence Murray. "An Exploratory Investigation of the Effects of Class Size and Scheduling Related to Achievement and Motivational Outcomes."
Unpublished Ed.D. dissertation, Michigan State University, Michigan, 1962.
Significant differences in statistically adjusted achievement outcomes were obtained in all three specific tests in senior English in favor of the experimental conditions. In physics, the adjusted achievement outcomes were not significantly different and in chemistry, the adjusted outcomes favored the control conditions. The experimental group ranged from 60 - 100 students while the control group was standard at about 30 students.

Woodson, Marshall Scott. "A Study of Relationships Between Certain Measures of Class Size in Elementary Schools And a Criterion of Pupil Achievement." Unpublished Ed.D. dissertation, Columbia University, New York, 1968.

A good study with multiple findings. It was concluded however, that there was a small inverse relationship between the academic achievement of pupils and class size.

SPECIAL PUBLICATIONS

McKeachie, W.J. "Research on Teaching at the College and University Level." Chapter 23 in N.L. Gage (Ed.), Handbook of Research on Teaching. Chicago: Rand-McNally, 1963.
Portions of this chapter deal with class-size in higher education, particularly concerning the size of lectures. The emphasis on this method (prevalent in higher education) make this excellent chapter largely irrelevant to the present survey.

Silver, A.B. "English Department Large-Small Class Study: English 50 - 60, Revised," A paper produced by Bakersfield Junior College revealed no significant differences between course completion rates and GPA's of large and small classes. These results seemed to justify the continuation of large group classes in English at the College.